

Abstract Submission No.: A-1243**Prediction of Contrast-associated Acute Kidney Injury With Machine-learning
in Patients Undergoing Contrast-enhanced Computed Tomography at
Emergency Room**

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Objectives : Radiocontrast is one of major causes of nephrotoxic acute kidney injury(AKI). Contrast-enhanced CT(CE CT) scan is frequently performed in emergency departments(ED), but predicting individualized risks of contrast-associated AKI(CA-AKI) with sufficient context from ED patients is challenging due to the fast-paced ED environment. We aimed to develop machine-learning(ML)-based CA-AKI prediction models for unselected ED patients.

Methods : We identified adult ED patients who had undergone CE CT between 2016 and 2020 in an academic tertiary referral hospital in Seoul, Korea. To predict CA-AKI development within next 7 days after CT contrast exposure, five ML models, including logistic regression(LR), random forest, extreme gradient boosting, light gradient boosting(LGB), and multi-layer perception, were tested by relying on medical history, vital signs, arrival modes, chief complaints, and initial laboratory results. Dataset was randomly divided into development and validation sets in 8:2 ratio. Based on selected variables with feature importance, we additionally built an AutoScore model to obtain interpretable ML results.

Results : Among 22,984 ED patients exposed to CT contrast media, CA-AKI developed in 1,862(8.1%) patients. 42 features were selected and used as input to models. LGB model showed the best performance with an area under ROC curves of 0.731, while LR model had the lowest performance. The top ten features in order of importance in predicting CA-AKI based on LGB model were baseline serum creatinine, systolic blood pressure(SBP), serum albumin, eGFR, BUN, body weight, serum uric acid, hemoglobin, triglyceride, and body temperature. Based on AutoScore model, high SBP(≥ 170 mmHg), hypoalbuminemia(< 3.5 mg/dL), and hyponatremia(< 125 mmol/L) had high scores > 10 .

Conclusions : We created an ML-based prediction model to predict the risk of CA-AKI for unselected ED patients. Considering the difficulty of predicting risk for CA-AKI development in ED patient encounters, our model can assist early recognition of AKI and nephroprotective point-of-care in ED patients undergoing CE CT scans.